IN THE CLAIMS:

1. (Currently amended) A method for providing congestion control in a communications network, the method comprising the steps of:

(a) transmitting a plurality of serial data transmission from a source node to a destination node;

(b) determining whether a congestion occurs in said network;

(c) determining a bandwidth capacity of said network;

(d) adjusting a sender rate at which said source is currently transmitting the data according to a first function of the determined bandwidth capacity if no congestion occurs, wherein the first function initially adjusts said sender rate non-linearly and then returns said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network; and,

(e) adjusting said sender rate of said source node according to a second function if congestion occurs.

2. (Previously presented) The method of claim 1, wherein said adjusting step (d) according to said first function includes increasing the number of packets transmitted by said source node.

3. (Previously presented) The method of claim 1, wherein said adjusting step (e) according to said second function includes decreasing the number of packets transmitted by said source node.

4. (Canceled)

5. (Previously presented) The method of claim 1, wherein said second function varies with said determined bandwidth capacity.

6. (Previously presented) The method of claim 1, wherein the step (e) further comprises, in calculating said second function, calculating said sender rate raised to a power exceeding unity.

7. (Previously presented) The method of claim 1, wherein the step (d) further comprises, in calculating said first function, calculating said sender rate raised to a power exceeding unity.

8. (Original) The method of claim 1, wherein said data flow from said source node is simultaneously transmitted to multiple destination nodes, and said bandwidth capacity is determined for each said data flow transmitted to each of said multiple destination nodes.

9. (Currently amended) A method for providing congestion control in a communications network, the method comprising the steps of:

(a) transmitting a plurality of serial data transmission from a source node to a destination node;

(b) monitoring a sending rate at which said source node is currently transmitting data to said network and a current rate at which said destination node is currently receiving data to determine whether a congestion state occurs;

(c) if no congestion state occurs, determining the bandwidth capacity of said network and increasing said sender rate of said source node according to a first function of the determined bandwidth capacity, wherein the first function initially adjusts said sender rate non-linearly and

then returns said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network; and,

(d) if a congestion state occurs, decreasing said sender rate of said source node according to a second function.

10. (Previously presented) The method of claim 9, wherein said second function varies with said determined bandwidth capacity.

11. (Canceled)

12. (Previously presented) The method of claim 9, wherein said decreasing further comprises, in calculating said second function, calculating said sender rate raised to a power exceeding unity.

13. (Previously presented) The method of claim 9, wherein said increasing further comprises, in calculating said first function, calculating said sender rate raised to a power exceeding unity.

14. (Original) The method of claim 9, wherein said data flow from said source node is simultaneously transmitted to multiple destination nodes, and said bandwidth capacity is determined for each said data flow transmitted to each of said multiple destination nodes.

15. (Original) The method of claim 9, wherein a congestion state occurs if the rate permitted by said destination node exceeds the capacity of said source node.

16. (Original) The method of claim 9, wherein said steps of increasing and decreasing said sender rate above and below an operating point for said network provide a maximum throughput at minimum delay time.

17. (Previously presented) The method of claim 9, wherein the step of decreasing said sender rate (fD (x_i)) according to said second function includes calculating the equations:

$$x_{i+1} = x_i - \beta x^l \quad \text{and} \quad \beta = 1 / \; mC^{l-1},$$

wherein x_{i+1} represents a next sending rate of data; x_i represents the current sending rate during cycle i; C represents the determined bandwidth capacity of said network, l represents a constant value greater than one; and, the value m ranges between $2 \leq m \leq 8$.

18. (Previously presented) The method of claim 9, wherein the step of decreasing said sender rate according to said first function includes calculating the equations:

$$x_{i+1} = x_i + \alpha x^{-k} \quad \text{and}$$

$$\alpha = \frac{C^{k+1}}{D},$$

wherein x_{i+1} represents a next sending rate of data; x_i represents the current sending rate during cycle i; C represents the determined bandwidth capacity of said network, k represents a constant value less than negative one; and, the value D ranges between $5 \leq D \leq 20$.

19. (Currently amended) A system for providing congestion control in a communications network by adjusting a sender rate between at least one sender node and destination node,

comprising:

a transmission module ~~means for~~ transmitting a plurality of data transmission from said source node to said destination node;

a capacity module ~~means for~~ determining a bandwidth capacity of said network;

a congestion module ~~means for~~ generating congestion feedback information based on the determined bandwidth capacity of said network to determine a congestion state; and,

an adjustment module ~~means for~~ adjusting said sender rate at which said source node is currently transmitting the data based on said congestion feedback information, the adjusted rate being a function of said determined bandwidth capacity of said network, wherein the function initially adjusts said sender rate non-linearly and then returns said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network.

20. (Currently Amended) The system of claim 19, further comprising a congestion feedback module ~~means for~~ utilizing said congestion feedback information to determine a congestion state in said network.

21. (Currently Amended) The system of claim 19, wherein said congestion module ~~generating means~~ comprise a monitoring module ~~means for~~ monitoring said sending rate at which said source node is currently transmitting data to said network and a current rate at which said destination node is currently receiving data to generate said congestion control information.

22. (Currently amended) A system for providing congestion control in a communications network by adjusting a sender rate between at least one sender node and destination node,

comprising:

means for transmitting a plurality of data transmission from said source node to said destination node;

means for determining a bandwidth capacity of said network;

means for generating congestion feedback information based on the bandwidth capacity of said network to determine a congestion state; and,

means for adjusting said sender rate at which said source node is currently transmitting the data based on said congestion feedback information, the bandwidth capacity of said network, wherein, if no congestion occurs, said adjusting means increase the number of packets transmitted by said source node initially at a ~~first~~ non-linear rate and then at a ~~second~~ linear rate if a predetermined range of the bandwidth capacity of said network is utilized.

23. (Currently Amended) The system of claim 19, wherein said ~~adjusting means~~ adjustment module decreases the number of packets transmitted by said source node at a predetermined rate if congestion occurs.

24. (Currently Amended) The system of claim 19, wherein said ~~adjusting means~~ adjustment module includes calculating, in evaluating said function, said sender rate raised to a power exceeding unity.

25. (Original) The system of claim 19, wherein said congestion feedback information is provided by at least one of said source node and said destination node.

26. (Currently amended) A system for providing a congestion control in a communications network by adjusting the sender rate between a sender node and a destination node, comprising:

a memory for storing a computer-readable code; and,

a processor operatively coupled to said memory, said processor configured to:

(a) transmit a plurality of serial data transmissions from said source node to said destination node;

(b) determine whether a congestion state occurs in said network;

(c) determine a bandwidth capacity of said network;

(d) adjust said sender rate at which said source node is currently transmitting the data according to a first function of the determined bandwidth capacity if no congestion occurs, wherein the first function initially adjusts said sender rate non-linearly and then returns said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network; and,

(e) adjust said sender rate of said source node according to a second function if congestion occurs.

27. (Previously presented) The system of claim 26, wherein said adjusting step (d) according to said first function includes increasing the number of packets transmitted by said source node.

28. (Previously presented) The system of claim 26, wherein said adjusting step (e) according to said second function includes decreasing the number of packets transmitted by said source node.

29. (Canceled)

30. (Previously presented) The system of claim 26, wherein said adjusting step (e) according to said second function varies with said determined bandwidth capacity.

31. (Previously presented) The system of claim 26, wherein the step (e) further comprises calculating, in calculating said second function, said sender rate raised to a power exceeding unity.

32. (Previously presented) The system of claim 26, wherein the step (d) further comprises calculating, in calculating said first function, said sender rate raised to a power exceeding unity.

33. (Currently amended) A machine-readable medium having stored thereon data representing sequences of instructions, and the sequences of instructions which, when executed by a processor, cause the processor to:

transmit a plurality of serial data transmissions from a source node to a destination node;

monitor a sending rate at which said source node is currently transmitting data to said network and a current rate at which said destination node is currently receiving data to determine whether a congestion state occurs; (c) if no congestion state occurs, determine the bandwidth capacity of said network and increase said sender rate of said source node according to a first function of the determined bandwidth capacity, wherein the first function initially adjusts said sender rate non-linearly and then returns said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network; and,

(d) if a congestion state occurs, decrease said sender rate of said source node according to a second function.

34. (Original) The machine-readable medium of claim 33, wherein said increase and decrease of said sender rate operate to establish a maximum data transmission rate and constant packet loss.

35. (Previously presented) The machine-readable medium of claim 33, wherein the decreasing further comprises, in calculating said second function, calculating said sender rate raised to a power exceeding unity.

36. (Original) The machine-readable medium of claim 33, wherein said data flow from said source node is simultaneously transmitted to multiple destination nodes, and said bandwidth capacity is determined for each said data flow transmitted to each of said multiple destination nodes.

37. (Previously presented) The machine-readable medium of claim 33, wherein the increasing further comprises, in calculating said first function, calculating said sender rate raised to a power exceeding unity.

38. (Previously presented) The machine-readable medium of claim 33, wherein the step of decreasing said sender rate ($f_D(x_i)$) according to said second function includes calculating the equations:

$$x_{i+1} = x_i - \beta x^{l} \quad \text{and} \quad \beta = 1 / \; mC^{l-1},$$

wherein x_{i+1} represents a next sending rate of data; x_i represents the current sending rate during cycle i; C represents the determined bandwidth capacity of said network, l represents a constant value greater than one; and, the value m ranges between $2 \leq m \leq 8$.

39. (Previously presented) The machine-readable medium of claim 33, wherein the step of decreasing said sender rate according to said first function includes calculating the equation:

$$x_{i+1} = x_i + \alpha x^{-k} \quad \text{and}$$

$$\alpha = \frac{C^{k+1}}{D},$$

wherein x_{i+1} represents a next sending rate of data; x_i represents the current sending rate during cycle i; C represents the determined bandwidth capacity of said network, k represents a constant value less than negative one; and, the value D ranges between $5 \leq D \leq 20$.

40. (Currently amended) A congestion controller disposed at a source node for a network, said source node being configured for currently transmitting the data toward a destination node at a sender rate that is controlled by said controller, and that is dictated by a first function of a currently determined bandwidth capacity of said network if it is determined that no congestion is occurring in said network, wherein the first function initially adjusts said sender rate non-linearly and then returns said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network, said controller being [[=]]configured for adjusting a

rate for currently transmitting said data toward said destination node according to a second function if the determination is that congestion is occurring in said network.